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(54) Method and apparatus for an external media buffer

Verfahren und Vorrichtung für einen externen Medienspeicher

Méthode et dispositif pour un magasin externe de supports

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EP 0 697 627 B1

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Description

[0001] The invention is related to media handling and transport systems, and more specifically to systems used in the imaging technology industry to temporarily store and transport photosensitive media between an image-setting device and an image-processing device. The image-setting and image-processing devices are each equipped with internal media transport systems designed to handle and transport the media within that particular device at the operating speed required by that device. Typically the media transport system of the image-setting device operates at a faster speed than that of the image-processing device. This poses a problem when the two devices are used together in an on-line operating mode, in which the media is transported directly from the image-setting device to the image-processing device rather than to an intermediate storage take-up cassette that is transferred manually from one device to the other. In the on-line operating mode, the media needs to be buffered between the image-setting device and the image-processing device because of the difference in operating speeds of the respective media transport systems. During on-line operation it is desirable to avoid down time of the image-setting device due to a slower operating speed of the image-processing device. It is also desirable to minimize the amount of floor space used by an on-line operating system. It is further desirable to minimize the cost of an on-line operating system.

[0002] Another problem encountered in media transporting systems is caused by the thickness and stiffness of the media. Plate materials having a thickness of approximately 0.3 mm (12 mils (1 mil = 1/1000 inch)) are more difficult to handle in media transport systems compared to media 0.1mm (4 mils) thick. Because this media is stiffer and harder to bend, generally a media transport path requires a large radius of curvature. Further, an inherent curvature at the leading end of a media supply or sheet causes difficulties with media loading. Sudden buckling and/or misfeeding due to the natural curl of the media can occur and disrupt the media handling or imaging as a result. It is therefore advantageous to prevent buckling and misguiding of the media during loading of media into a media handling system.

[0003] US-A-5 110 104 discloses a sheet transporting apparatus having a sheet storage device capable of storing sheets and provided in the middle of a sheet transport path and a carriage unit with a sheet discharge mechanism for transporting a sheet to the sheet storage device and capable of reciprocating motion substantially above the sheet storage device.

[0004] In view of the above difficulties encountered in media handling and transport systems, it is accordingly a general object of the invention to provide an external media transport mechanism for buffering media between an image-setting device and an image-processing device used together in an on-line operating mode.

[0005] It is an object of the invention to minimize the amount of floor space required by an external media transport mechanism used with an image-setting device and an image-processing device in an on-line operating mode.

[0006] It is further an object of the invention to accommodate media of varying stiffness and thickness during loading of the media into an external media transport mechanism and thereby prevent buckling of the media during transport.

[0007] An apparatus and a method for buffering a sheet of media between a first media handling station and a second media handling station according to the present invention are defined in claim 1 and claim 5.

[0008] The features and objects of the invention will become apparent in the following description taken in connection with the accompanying drawings, in which:

Figures 1A-D are sequential partial sectional side views of the stages of operation of an external buffer according to the invention in combination with an imagesetter and a processor;

Figure 2 is an illustrative view of an external buffer according to the invention;

Figure 3 is a partial sectional front view of a pair of media transport rollers used in an external buffer according to the invention; and

Figure 4 is a partial sectional side view of a second embodiment of an external buffer according to the invention in combination with an imagesetter and a processor.

[0009] Referring to Figures 1A and 2 it is shown that an external media buffer, generally indicated as 10, is positioned between an imagesetter, generally referred to as 12, and a processor, generally referred to as 14.

In the imagesetter 12, media 16 is fed from a continuous web supply roll to a recording support surface to be imaged and then delivered as cut sheets into the buffer 10 by a media transport system 18.

[0010] The buffer 10 has a carriage 20 which is supported for linear motion on two horizontally spaced parallel guide rails 22. The guide rails 22 traverse a width spanning between the imagesetter 12 and the processor 14. The guide rails 22 are attached to the interior of a buffer housing 24 or may alternatively be directly attached to the exterior of the imagesetter 12 and the processor 14, respectively. A pair of media transport rollers 26 is mounted within the carriage 20 in a direction lengthwise perpendicular to the guide rails 22. The rollers 26 are positioned vertically below and in between

the guide rails 22 and are mounted for rotation by bearings 27 mounted within the carriage end plates 28, shown in Fig. 3. A drive roller 26b is driven by means of a motor 30 mounted on an end plate 28, while the other

is an idler roller 26a driven through rolling contact with the drive roller 26b or through media movement in the nip of the rollers 26 transferring the rotation of the drive roller 26b to the idler roller 26a.

[0011] In Fig. 3, it is shown that the drive roller 26b has a drive gear 32 mounted onto its end shaft 34 that is driven by a gear connection (not shown) with the motor 30. The drive gear 32 is fitted with an overrunning clutch 36 allowing the end shaft 34 and the attached drive roller 26b to have one-way rotation with respect to the drive gear 32. The idler roller 26a is equipped with a break mechanism 40 on its end shaft 42 to seize rotation of the idler roller 26a and consequently of roller pair 26. It will be appreciated that the break mechanism can be an electro-magnetic brake, a friction disk brake, or other suitable means for stopping rotation of the idler roller.

[0012] A carriage drive motor 50, shown in Fig. 2, is attached to a top side 52 of the carriage 20 and is engaged with a lead screw 54 that spans across the buffer housing 24 (Fig. 1A). The lead screw 54 is fixed to the interior of the buffer housing 24 parallel to the guide rails 22. The motor 50 and lead screw 54 are engaged through a nut 56 interface. The nut 56 has internal threads which engage the lead screw 54 such that when the motor 50 rotates the nut 56, the carriage 20, restricted from rotation about the lead screw 54 by engagement with the guide rails 22, is translated linearly along the guide rails 22. It will be appreciated that the carriage may alternatively be driven by a friction drive wheel in direct contact with one of the guide rails or by other suitable means.

[0013] In Fig. 1A, it is shown that two sensors 60, 62 are mounted within the buffer 10 to detect media 16 movement by means of mechanical interrupt switches. Signals from the switches are relayed to the buffer roller motor 30 and carriage motor 50 to start and stop the motors according to a predetermined sequence. A first sensor 60 is positioned at an entrance to the buffer 10 and a second sensor 62 is positioned on the carriage 20 on an exit side of the buffer rollers 26. It will be understood that the location of the first sensor can be within the image-setting device for instance if the walls between the buffer and the image-setting device are removed to integrate the two units. Further, the sensors can be mechanical interrupt switches, optical sensors or a combination of both.

[0014] Now, with reference to Figs. 1A-1D the operation of the buffer 10 will be described. In Fig. 1A, while the carriage 20 is in a media pick-up position, a leading end 70 of media 16 is fed at speed V1 into the buffer 10 through a media guide 72 by the media transport system 18 of the imagesetter 12. The first sensor 60 senses the leading end 70 of the media entering the buffer and activates the buffer rollers 26 to rotate. A movable media guide 74 is initially in a horizontal position to serve as a guide for the media 16 into the nip of the rollers 26. The media 16 moves along the guide 74 as the leading end

70 approaches the nip of the rotating buffer rollers 26.

[0015] In Fig. 1B, the media 16 passes through the rollers 26 and reaches the second media sensor 62. In response to the sensor's signal, the roller motor 30 (Fig. 5) 2) is stopped and the idler roller brake mechanism 40 is activated to stop the buffer rollers 26 from rotating and to hold the leading end 70 stationary with respect to the buffer rollers 26. Once the leading end 70 is gripped by the rollers 26, the carriage motor 50 (Fig. 2) turns on to 10 transport the carriage 20 along the rails 22 at speed V2. The leading end 70 is held in the nip of the rollers 26 at the second media sensor 62 while speed V1 is greater than speed V2. As the carriage 20 begins to travel away from the imagesetter, the movable guide 74 automatically 15 pivots down from the horizontal position to an angled position due to a linkage 75 between the movable guide 74 and a follower 76 that moves along a template 77 as the carriage is transported. The angled position allows a slack loop 78 to form and prevents bucking of 20 the media in an upward direction which can result in sudden jerking of the media 16 causing media jams in the transport system of the imagesetter or wrinkling of the media. The slack loop 78 grows larger as the leading end 70 is held between the buffer rollers 26 and the media 16 continues to enter the buffer 10 from the imagesetter 12. It will be appreciated that the movable media 25 guide can alternatively be pivotally attached to the interior of the buffer housing to pivot down from a horizontal position toward the housing wall and be operated by a 30 motor that responds to the second sensor's signals. The linkage, follower and template are not needed in this alternative embodiment.

[0016] Referring to Fig. 1C, a storage bin, generally indicated as 79, located below the carriage 20 is essentially 35 an open space for the media 16 to form a slack loop in. The trailing end 80 of the media 16 enters the buffer 10 and drops down into the bin 79. The carriage 20 continues to travel along the rails 22 to the processor 14 side where the leading end 70 becomes aligned with 40 an exit guide 82 adjacent to the processor and the carriage 20 is in the delivery position. Then, the processor 14 is checked to see if it is ready to accept the sheet of media 16 stored in the buffer 10. Upon a signal from the first sensor 60 indicating the media 16 is no longer entering the buffer 10 and a signal from the processor 14 indicating it is ready, the brake mechanism 40 (Fig. 4) is shut off and the buffer rollers 26 are rotated to transport the leading end 70 of the sheet into the processor 14. In the meantime, the imagesetter is in the process 50 of imaging the next job and as the transport system of the imagesetter is empty, upon completion the job can be cut from the web and delivered as a sheet to the transport system of the imagesetter.

[0017] Referring now to Fig. 1D, a processor input 55 sensor 84 senses the media 16 as it enters the processor rollers 86. In response to the sensor's 84 signal, the processor transport rollers 86 are turned on and the rotation of the buffer rollers 26 is stopped. The overrunning

clutch assembly 36 (Fig. 3) on the drive roller 26b allows the media 16 to be pulled out from the buffer rollers 26. When the sheet of media 16 leaves the buffer rollers 26, the second sensor 62 sees the empty buffer rollers 26 and in response the carriage motor 50 is driven in a reverse direction to begin the return of the carriage 20 to the imagesetter 12 side of the buffer 10. As the carriage 20 is positioned adjacent to the imagesetter 12, the follower 76 on the template 77 causes the movable media guide 74 to pivot to the horizontal position, so that the next sheet of media can be fed into the buffer 10 and the sequence then repeated.

[0018] A second embodiment of the media buffer is shown in Fig. 4 in which a feature for media loading is shown. The buffer elements in Fig. 4 are referred to with the same reference numerals as those corresponding elements in Figs. 1A-D. To assist with loading the media 16 into the buffer 10 from the imagesetter 12, the media 16 is pre-deflected by media guides 90 along the media path to account for the stiffness and the natural curl of the media 16. The buffer rollers 26 are positioned vertically below the media path of the imagesetter 12 relative to the previous embodiment, for cooperation with downward deflecting guides 90. The guides 90 serve to pre-deflect the media 16 to a curved shape opposite from its natural curvature, to prevent buckling of the media 16 during input loading into the buffer 10, and to urge the media 16 into a pre-loop curvature, so that the slack loop 78 will form downwardly, as in Fig. 1B.

[0019] The carriage 20 is in the media pick-up position adjacent to the imagesetter 12 to pick-up the leading end 70 of the media 16 from the media transport system 18 of the imagesetter 12. The leading end 70 is fed at speed V1 into the buffer 10 through the downward deflecting media guides 90 of the buffer 10. The first sensor 60 senses the leading end 70 of the media entering the buffer 10 and activates the buffer rollers 26 to rotate. The movable media guide 74 is initially in a horizontal position to serve as a guide for the media 16 into the nip of the rollers 26. The media 16 moves along the guide 74 as the leading end 70 approaches the nip of the rotating buffer rollers 26. The buffer rollers 26 have a center axis C-C that is angled with respect to a vertical axis to further urge the media into the pre-loop curvature 92 as the leading end 70 enters the nip of the buffer rollers 26. The pre-loop configuration 92 is easily formed for thick, stiff media by the combination of buffer rollers being located vertically below the media path of the imagesetter, the downward deflecting media guides, and the angled center axis C-C of the buffer rollers 26.

[0020] As in the previous embodiment, the media 16 then passes through the rollers 26 and reaches the second media sensor 62 when the buffer rollers 26 stop to hold the leading end 70 stationary with respect to the buffer rollers 26. Then the process of loading the media is then complete, and continuing operation of the buffer 10 proceeds in the same manner as the previous embodiment to deliver the media to the processor rollers

86. In the embodiment depicted in Fig. 4, the processor rollers 86 can be positioned slightly above the horizontal plane of the buffer rollers to facilitate the loading of the media into the processor rollers.

5 **[0021]** It will be appreciated by those skilled in the art that in the above described embodiments the buffer rollers that serve as a means for gripping the leading end of the media during loading of the media into the buffer, can alternatively be replaced with a vacuum pick-up mechanism mounted on the carriage which cooperates with the media guides and sensors described in the preferred embodiment. Further, it will be appreciated that the external buffer can be used in many different applications and is not limited to media handling between an 10 imagesetter and a processor.

15 **[0022]** While this invention has been described in terms of a preferred embodiment, those skilled in the art will appreciate that various modifications, substitutions, omissions and changes may be made. Accordingly, it is 20 intended that the scope of the present invention be limited solely by the scope of the following claims.

Claims

- 25 1. A buffering apparatus (10) for buffering a sheet of media (16) between a first media handling station (18) and a second media handling station (86), said sheet of media (16) having a leading end (70) and a trailing end (80), said leading end (70) of the media (16) being fed at a first speed (V1) into the buffering apparatus (10), said buffering apparatus comprising:
 - 30 - a carriage (20) movably supported between the first media handling station (18) and the second media handling station (86), the carriage (20) further including a drive motor (50) for advancing the carriage from a pick-up position adjacent to the first media handling station (18) to a delivery position adjacent to the second media handling station (86) and back again, said carriage (20) being moveable at a second speed (V2) which is slower than the first speed (V1);
 - 35 - a pair of media transport rollers (26) rotatably supported by the carriage (20) such that a longitudinal axis of the rollers (26) is perpendicular to the axis of motion of the carriage (20), said pair of media transport rollers (26) including a drive roller (26b) driven by a motor (30) and an idler roller (26a), the drive roller (26b) and the idler roller (26a) being in rolling contact with each other thereby forming a nip therebetween for transporting the sheet of media (16) through the nip when the drive roller (26b) is driven and for holding the sheet of media (16) when the drive roller (26b) is stopped;
- 40
- 45
- 50
- 55

- a first sensor (60) positioned near an entrance to the buffering apparatus (10) for detecting the leading end (70) of the sheet of media being delivered by the first media handling station (18) and for detecting the trailing end (80) of the sheet of media (16) as it exits the first media handling station (18);
 - a second sensor (62) positioned proximate to an exit side of the transport rollers (26) for detecting the leading end (70) of the sheet of media (16) as it advances past the media transport rollers (26) and for detecting the trailing end (80) of the sheet of media as it exits the media transport rollers (26);
 - means for starting rotation of the pair of media transport rollers (26) at the first speed (V1) to receive the leading end (70) from the first media handling station (18) in response to the leading end (70) passing the first sensor (60) thereby advancing the leading end (70) through the nip between the pair of rollers (26); and
 - means for stopping the pair of rollers (26) to hold the leading end (70) in a stationary position in response to the leading end (70) passing the second sensor (62);
 - means for moving the carriage (20) at the second speed (V2) to transport said pair of rollers (26) holding the leading end (70) from the first media handling station (18) to the second media handling station (86), the trailing end (80) of the media (16) being pulled behind the carriage (20); **characterised by:**
 - pivotally movable media guide means (74) located between the pair of media transport rollers and said first media handling station, having a first substantially horizontal position for guiding the leading end (70) of the media sheet (16) received from the first media handling station (18) to the pair of media transport rollers (26), and a second angled position which allows the trailing end (80) and a slack loop (78) of the media (16) to be pulled behind the carriage (20) while the carriage (50) moves from the first media handling station (18) to the second media handling station (86).
2. The buffering apparatus (10) according to claim 1 wherein the first media handling station (18) is internal to an imagesetter (12) and wherein the second media handling station (86) is internal to a processor (14). 50
3. The buffering apparatus (10) according to any one of the previous claims further comprising brake means (40) for stopping rotation of and holding the idler roller (26a). 55
4. The buffering apparatus (10) according to any one of the previous claims further comprising overrunning clutch means (36) for allowing the drive roller (26b) to have one-way rotation with respect to a drive gear (32) for said drive roller (26b). 5
5. A method for buffering a media sheet (16) between a first media handling station (18) and a second media handling station (86) by a pair of media transport rollers (26) carried by a movable carriage (20), comprising the steps of:
- positioning the carriage (20) at a media pick-up position adjacent to the first media handling station (18) for receiving a leading end (70) of the media sheet (16) therefrom at a first continuous speed (V1);
 - rotating the pair of media transport rollers (26) by an amount sufficient to receive the leading end (70) of the media sheet (16) between the pair of media transport rollers (26) and then stopping the rotation of the pair of media transport rollers (26) after the leading end (70) is advanced beyond the rollers (26);
 - transporting the carriage (20) and the pair of media transport rollers (26) holding leading end (70) at a second continuous speed (V2) which is slower than the first continuous speed (V1), from the first media handling station (18) toward the second media handling station (86);
- characterised by** the steps of:
- forming a slack loop (78) of media between the media transport rollers (26) moving at the speed (V2) and the first media handling station (18) which is feeding the sheet of media (16) at the speed (V1) said slack loop continuing to form until a trailing end (80) of the media sheet (16) is released from the first media handling station (18), said trailing end (80) being pulled behind the moving carriage (20);
 - positioning a pivotally movable media guide (74) attached to the carriage (20) in a first substantially horizontal position when the carriage (20) is positioned at the media pick-up position for guiding the leading edge (70) between the pair of media transport rollers (26); and
 - positioning the pivotally movable guide (74) in a second angled position as the carriage (20) moves away from the pick-up position, said angled position guiding the sheet of media (16) during the forming of the slack loop (78)
6. The buffering method according to claim 5 further

- comprising the steps of:
- generating a first signal when said leading end (70) enters said buffer, said first signal being used to start the rotation of said pair of media transport rollers (26);
 - generating a second signal when said leading end (70) is sufficiently received between the pair of media roller (26), said second signal being used to stop the rotation of the pair of media transport rollers (26) and to start transporting the carriage (20) toward the delivery position adjacent to the second media handling station (86); and
 - generating a third signal when the leading end (70) is released from the first media handling station (18).
7. The buffering method according to any one of claims 5 or 6, further comprising the step of: upon the release of the leading end (70) from the first media handling station (18) starting the rotation of the pair of media transport rollers (26) to advance the leading end (70) to the second media handling station (86).
8. The buffering method according to claim 7 wherein said second media handling station (86) comprises a processor (14), the buffering method further comprising the step of generating a fourth signal from the processor (14) indicating that the processor (14) is ready to accept the leading end (70), the fourth signal being used to start the rotation of the pair of media transport rollers (26) to advance the leading end (70) to the processor (14).
9. The buffering method according to any one of claims 5 - 8, further comprising the step of, after transporting the entire media sheet (16) beyond the pair of media transport rollers (26) to the second media handling station (86), then moving the carriage (20) at the second speed (V2) back to the media pick-up position adjacent to the first media handling station (18) for receiving a leading end (70) of another sheet of media (16).
- Patentansprüche**
1. Puffervorrichtung (10) zum Puffern eines Medienblatts (16) zwischen einer ersten Medienhandhabungsstation (18) und einer zweiten Medienhandhabungsstation (86), wobei das Medienblatt (16) ein Vorderende (70) und ein Hinterende (80) aufweist, wobei das Vorderende (70) des Mediums (16) mit einer ersten Geschwindigkeit (V1) in die Puffervorrichtung (10) vorgeschoben wird, wobei die Puffervorrichtung folgendes umfaßt:
 - einen Wagen (20), der zwischen der ersten Medienhandhabungsstation (18) und der zweiten Medienhandhabungsstation (86) beweglich getragen wird, wobei der Wagen (20) weiterhin einen Antriebsmotor (50) zum Vorbewegen des Wagens aus einer Aufnahmeposition neben der ersten Medienhandhabungsstation (18) in eine Lieferposition neben der zweiten Medienhandhabungsstation (86) und wieder zurück enthält, wobei der Wagen (20) mit einer zweiten Geschwindigkeit (V2) bewegt werden kann, die langsamer ist als die erste Geschwindigkeit (V1);
 - ein Paar Medientransportwalzen (26), die derart von dem Wagen (20) drehbar getragen werden, daß eine Längsachse der Walzen (26) senkrecht zu der Bewegungsachse des Wagens (20) verläuft, wobei das Paar Medientransportwalzen (26) eine durch einen Motor (30) angetriebene Antriebswalze (26b) und eine Mitläufewalze (26a) enthält, wobei die Antriebswalze (26b) und die Mitläufewalze (26a) miteinander in Rollkontakt stehen und dadurch dazwischen einen Walzenspalt bilden, um das Medienblatt (16) durch den Walzenspalt zu transportieren, wenn die Antriebswalze (26b) angetrieben wird, und um das Medienblatt (16) zu halten, wenn die Antriebswalze (26b) angehalten wird;
 - einen neben einem Eingang zu der Puffervorrichtung (10) positionierten ersten Sensor (60) zum Erfassen des Vorderendes (70) des durch die erste Medienhandhabungsstation (18) zugeführten Medienblatts und zum Erfassen des Hinterendes (80) des Medienblatts (16), wenn es aus der ersten Medienhandhabungsstation (18) austritt;
 - einen in der Nähe einer Austrittsseite der Transportwalzen (26) positionierten zweiten Sensor (62) zum Erfassen des Vorderendes (70) des Medienblatts (16) bei seiner Vorbeibewegung an den Medientransportwalzen (26) und zum Erfassen des Hinterendes (80) des Medienblatts, wenn es aus den Medientransportwalzen (26) austritt;
 - Mittel zum Beginnen der Drehung des Paars Medientransportwalzen (26) mit der ersten Geschwindigkeit (V1) zum Empfangen des Vorderendes (70) von der ersten Medienhandhabungsstation (18) als Reaktion darauf, daß das Vorderende (70) den ersten Sensor (60) pas-

- siert, wodurch das Vorderende (70) durch den Walzenspalt zwischen dem Paar Walzen (26) vorgeschoben wird; und
- Mittel zum Anhalten des Paars Walzen (26), um das Vorderende (70) als Reaktion darauf, daß es den zweiten Sensor (62) passiert, in einer stationären Position zu halten; 5
 - Mittel zum Bewegen des Wagens (20) mit der zweiten Geschwindigkeit (V2) zum Transportieren des Paars Walzen (26), die das Vorderende (70) halten, von der ersten Medienhandhabungsstation (18) zu der zweiten Medienhandhabungsstation (86), wobei das Hinterende (80) des Mediums (16) hinter dem Wagen (20) gezogen wird; **gekennzeichnet durch:** 10
 - ein schwenkbar bewegliches Medienführungsmitte (74), das zwischen dem Paar Medientransportwalzen und der ersten Medienhandhabungsstation angeordnet ist und eine erste im wesentlichen horizontale Position zum Führen des Vorderendes (70) des von der ersten Medienhandhabungsstation (18) empfangenen Medienblatts (16) zu dem Paar Medientransportwalzen (26) und eine zweite abgewinkelte Position, **durch** die das Hinterende (80) und eine durchhängende Schleife (78) des Mediums (16) hinter dem Wagen (20) gezogen werden kann, während sich der Wagen (50) von der ersten Medienhandhabungsstation (18) zu der zweiten Medienhandhabungsstation (86) bewegt, aufweist. 15
 - ein schwenkbar bewegliches Medienführungsmitte (74), das zwischen dem Paar Medientransportwalzen und der ersten Medienhandhabungsstation angeordnet ist und eine erste im wesentlichen horizontale Position zum Führen des Vorderendes (70) des von der ersten Medienhandhabungsstation (18) empfangenen Medienblatts (16) zu dem Paar Medientransportwalzen (26) und eine zweite abgewinkelte Position, **durch** die das Hinterende (80) und eine durchhängende Schleife (78) des Mediums (16) hinter dem Wagen (20) gezogen werden kann, während sich der Wagen (50) von der ersten Medienhandhabungsstation (18) zu der zweiten Medienhandhabungsstation (86) bewegt, aufweist. 20
 - ein schwenkbar bewegliches Medienführungsmitte (74), das zwischen dem Paar Medientransportwalzen und der ersten Medienhandhabungsstation angeordnet ist und eine erste im wesentlichen horizontale Position zum Führen des Vorderendes (70) des von der ersten Medienhandhabungsstation (18) empfangenen Medienblatts (16) zu dem Paar Medientransportwalzen (26) und eine zweite abgewinkelte Position, **durch** die das Hinterende (80) und eine durchhängende Schleife (78) des Mediums (16) hinter dem Wagen (20) gezogen werden kann, während sich der Wagen (50) von der ersten Medienhandhabungsstation (18) zu der zweiten Medienhandhabungsstation (86) bewegt, aufweist. 25
 - ein schwenkbar bewegliches Medienführungsmitte (74), das zwischen dem Paar Medientransportwalzen und der ersten Medienhandhabungsstation angeordnet ist und eine erste im wesentlichen horizontale Position zum Führen des Vorderendes (70) des von der ersten Medienhandhabungsstation (18) empfangenen Medienblatts (16) zu dem Paar Medientransportwalzen (26) und eine zweite abgewinkelte Position, **durch** die das Hinterende (80) und eine durchhängende Schleife (78) des Mediums (16) hinter dem Wagen (20) gezogen werden kann, während sich der Wagen (50) von der ersten Medienhandhabungsstation (18) zu der zweiten Medienhandhabungsstation (86) bewegt, aufweist. 30
 - ein schwenkbar bewegliches Medienführungsmitte (74), das zwischen dem Paar Medientransportwalzen und der ersten Medienhandhabungsstation angeordnet ist und eine erste im wesentlichen horizontale Position zum Führen des Vorderendes (70) des von der ersten Medienhandhabungsstation (18) empfangenen Medienblatts (16) zu dem Paar Medientransportwalzen (26) und eine zweite abgewinkelte Position, **durch** die das Hinterende (80) und eine durchhängende Schleife (78) des Mediums (16) hinter dem Wagen (20) gezogen werden kann, während sich der Wagen (50) von der ersten Medienhandhabungsstation (18) zu der zweiten Medienhandhabungsstation (86) bewegt, aufweist. 35
2. Puffervorrichtung (10) nach Anspruch 1, wobei sich die erste Medienhandhabungsstation (18) innerhalb eines Belichters (12) befindet und sich die zweite Medienhandhabungsstation (86) innerhalb eines Prozessors (14) befindet. 40
3. Puffervorrichtung (10) nach einem der vorhergehenden Ansprüche, weiterhin mit Bremsmitteln (40), um die Drehung der Mitläufewalze (26a) anzuhalten und um sie zu halten. 45
4. Puffervorrichtung (10) nach einem der vorhergehenden Ansprüche, weiterhin mit einem Freilaufkupplungsmittel (36), damit sich die Antriebswalze (26b) bezüglich eines Antriebgetriebes (32) für die Antriebswalze (26b) in einer Richtung drehen kann. 50
5. Verfahren zum Puffern eines Medienblatts (16) zwischen einer ersten Medienhandhabungsstation (18) und einer zweiten Medienhandhabungsstation (86) durch ein von einem beweglichen Wagen (20) getragenes Paar Medientransportwalzen (26), mit den folgenden Schritten: 55
- Positionieren des Wagens (20) in einer Medienaufnahmeposition neben der ersten Medienhandhabungsstation (18), um ein Vorderende (70) des Medienblatts (16) von dort mit einer ersten kontinuierlichen Geschwindigkeit (V1) zu empfangen;
 - Drehen des Paars Medientransportwalzen (26) um einen Betrag, der ausreicht, das Vorderende (70) des Medienblatts (16) zwischen dem Paar Medientransportwalzen (26) zu empfangen, und dann Anhalten der Drehung des Paars Medientransportwalzen (26), nachdem das Vorderende (70) über die Walzen (26) hinaus vorgeschoben worden ist;
 - Transportieren des Wagens (20) und des Paars das Vorderende (70) haltender Medientransportwalzen (26) mit einer zweiten kontinuierlichen Geschwindigkeit (V2), die langsamer ist als die erste kontinuierliche Geschwindigkeit (V1), von der ersten Medienhandhabungsstation (18) zu der zweiten Medienhandhabungsstation (86);
- gekennzeichnet durch** die folgenden Schritte:
- Bilden einer durchhängenden Schleife (78) aus Medium zwischen den sich mit der Geschwindigkeit (V2) bewegenden Medientransportwalzen (26) und der ersten Medienhandhabungsstation (18), die das Medienblatt (16) mit der Geschwindigkeit (V1) vorschiebt, wobei sich die durchhängende Schleife weiterhin bildet, bis ein Hinterende (80) des Medienblatts (16) von der ersten Medienhandhabungsstation (18) freigegeben wird, wobei das Hinterende (80) hinter dem sich bewegenden Wagen (20) gezogen wird;
 - Positionieren einer an dem Wagen (20) angebrachten schwenkbar bewegbaren Medienführung (74) in einer ersten, im wesentlichen horizontalen Position, wenn der Wagen (20) in der Medienaufnahmeposition positioniert ist, um die Vorderkante (70) zwischen dem Paar Medientransportwalzen (26) zu führen; und
 - Positionieren der schwenkbar bewegbaren Führung (74) in einer zweiten abgewinkelten Position, wenn sich der Wagen (20) von der Aufnahmeposition weg bewegt, wobei die abgewinkelte Position das Medienblatt (16) während der Bildung der durchhängenden Schleife (78) führt.
 - Pufferverfahren nach Anspruch 5, weiterhin mit den folgenden Schritten:

- Erzeugen eines ersten Signals, wenn das Vorderende (70) in den Puffer eintritt, wobei das erste Signal zum Beginnen der Drehung des Paars Medientransportwalzen (26) verwendet wird; 5
- Erzeugen eines zweiten Signals, wenn das Vorderende (70) ausreichend zwischen dem Paar Medienwalzen (26) empfangen worden ist, wobei mit dem zweiten Signal die Drehung des Paars Medientransportwalzen (26) angehalten und der Transport des Wagens (20) in die Lieferposition neben der zweiten Medienhandhabungsstation (86) gestartet wird; und 10
- Erzeugen eines dritten Signals, wenn das Vorderende (70) von der ersten Medienhandhabungsstation (18) freigegeben wird. 15
7. Pufferverfahren nach einem der Ansprüche 5 oder 6, weiterhin mit dem Schritt, nach der Freigabe des Vorderendes (70) aus der ersten Medienhandhabungsstation (18) die Drehung des Paars Medientransportwalzen (26) zu starten, um das Vorderende (70) zu der zweiten Medienhandhabungsstation (86) vorzuschieben. 20
8. Pufferverfahren nach Anspruch 7, wobei die zweite Medienhandhabungsstation (86) einen Prozessor (14) umfaßt, wobei das Pufferverfahren weiterhin den Schritt umfaßt, ein vierter Signal von dem Prozessor (14) zu erzeugen, das anzeigt, daß der Prozessor (14) bereit ist, das Vorderende (70) anzunehmen, wobei mit dem vierten Signal die Drehung des Paars Medientransportwalzen (26) gestartet wird, um das Vorderende (70) zu dem Prozessor (14) vorzuschieben. 30
9. Pufferverfahren nach einem der Ansprüche 5-8, weiterhin mit dem Schritt, nach dem Transport des gesamten Medienblatts (16) über das Paar Medientransportwalzen (26) hinaus zu der zweiten Medienhandhabungsstation (86) den Wagen (20) dann mit der zweiten Geschwindigkeit (V2) zurück zu der Medienaufnahmeposition neben der ersten Medienhandhabungsstation (18) zu bewegen, um ein Vorderende (70) eines anderen Medienblatts (16) zu empfangen. 40
- Revendications
1. Appareil de stockage temporaire (10) pour le stockage temporaire d'une feuille de support (16) entre un premier poste de manipulation de supports (18) et un deuxième poste de manipulation de supports (86), ladite feuille de support (16) présentant un bord avant (70) et un bord arrière (80), ledit bord 45
- avant (70) du support (16) étant introduit à une première vitesse (V1) dans l'appareil de stockage temporaire (10), ledit appareil de stockage temporaire comprenant : 50
- un chariot (20) soutenu mobile entre le premier poste de manipulation de supports (18) et le deuxième poste de manipulation de supports (86), le chariot (20) comportant en outre un moteur d'entraînement (50) destiné à faire avancer le chariot d'une position de collecte adjacente au premier poste de manipulation de supports (18) à une position de livraison adjacente au deuxième poste de manipulation de supports (86) et dans le sens inverse, ledit chariot (20) étant mobile à une deuxième vitesse (V2) plus lente que la première vitesse (V1) ; 55
 - une paire de rouleaux de transport de support (26) soutenus rotatifs par le chariot (20) de telle sorte qu'un axe longitudinal des rouleaux (26) soit perpendiculaire à l'axe de mouvement du chariot (20), ladite paire de rouleaux de transport de support (26) comportant un rouleau d'entraînement (26b) entraîné par un moteur (30) et un rouleau libre (26a), le rouleau d'entraînement (26b) et le rouleau libre (26a) étant en contact roulant l'un avec l'autre, pour former ainsi entre eux une ligne de contact en vue de transporter la feuille de support (16) à travers la ligne de contact lorsque le rouleau d'entraînement (26b) est entraîné et en vue de maintenir la feuille de support (16) lorsque le rouleau d'entraînement (26b) est interrompu ; 60
 - un premier capteur (60) placé près d'une entrée de l'appareil de stockage temporaire (10) en vue de détecter le bord avant (70) de la feuille de support fournie par le premier poste de manipulation de supports (18) et en vue de détecter le bord arrière (80) de la feuille de support (16) lorsqu'il sort du premier poste de manipulation de supports (18) ; 65
 - un deuxième capteur (62) placé à proximité d'un côté de sortie des rouleaux de transport (26) en vue de détecter le bord avant (70) de la feuille de support (16) lorsqu'il s'avance au-delà des rouleaux de transport de support (26) et en vue de détecter le bord arrière (80) de la feuille de support lorsqu'il sort des rouleaux de transport de support (26) ; 70
 - un moyen de mise en rotation la paire de rouleaux de transport de support (26) à la première vitesse (V1) pour recevoir le bord avant (70) provenant du premier poste de manipulation de supports (18) en réponse au passage du bord 75

avant (70) devant le premier capteur (60), en faisant ainsi avancer le bord avant (70) à travers la ligne de contact entre la paire de rouleaux (26) ; et

- un moyen d'interruption de la paire de rouleaux (26) pour maintenir le bord avant (70) dans une position immobile en réponse au passage du bord avant (70) devant le deuxième capteur (62) ;
- un moyen de déplacement du chariot (20) à la deuxième vitesse (V2) pour transporter ladite paire de rouleaux (26) maintenant le bord avant (70) du premier poste de manipulation de supports (18) au deuxième poste de manipulation de supports (86), le bord arrière (80) du support (16) étant tiré derrière le chariot (20) ;

caractérisé par

- un moyen de guidage de support pivotant (74) disposé entre la paire de rouleaux de transport de support et ledit premier poste de manipulation de supports, possédant une première position essentiellement horizontale en vue de guider le bord avant (70) de la feuille de support (16) reçue depuis le premier poste de manipulation de supports (18) vers la paire de rouleaux de transport de support (26), et une deuxième position inclinée permettant au bord arrière (80) et à une boucle de mou (78) du support (16) d'être tirés derrière le chariot (20) tandis que le chariot (50) se déplace du premier poste de manipulation de supports (18) au deuxième poste de manipulation de supports (86).

2. Appareil de stockage temporaire (10) selon la revendication 1, dans lequel le premier poste de manipulation de supports (18) est interne à une photocomposeuse (12), et dans lequel le deuxième poste de manipulation de supports (86) est interne à une développeuse (14).

3. Appareil de stockage temporaire (10) selon l'une quelconque des revendications précédentes, comprenant en outre un moyen de freinage (40) pour interrompre la rotation du rouleau libre (26a) et le maintenir.

4. Appareil de stockage temporaire (10) selon l'une quelconque des revendications précédentes, comprenant en outre un moyen formant embrayage à roue libre (36) pour permettre la rotation dans un sens du rouleau d'entraînement (26b) par rapport à un engrenage d'entraînement (32) pour ledit rouleau d'entraînement (26b).

5. Procédé de stockage temporaire d'une feuille de support (16) entre un premier poste de manipulation de supports (18) et un deuxième poste de manipulation de supports (86) grâce à une paire de rouleaux de transport de support (26) portés par un chariot mobile (20), comprenant les étapes consistant à :

- placer le chariot (20) à une position de collecte du support adjacente au premier poste de manipulation de supports (18) en vue d'en recevoir un bord avant (70) de la feuille de support (16) à une première vitesse continue (V1) ;
- entraîner en rotation la paire de rouleaux de transport de support (26) d'une quantité suffisante pour recevoir le bord avant (70) de la feuille de support (16) entre la paire de rouleaux de transport de support (26), puis interrompre la rotation de la paire de rouleaux de transport de support (26) une fois que le bord avant (70) s'est avancé au-delà des rouleaux (26) ;
- transporter le chariot (20) et la paire de rouleaux de transport de support (26) maintenant le bord avant (70) à une deuxième vitesse continue (V2) plus lente que la première vitesse continue (V1), du premier poste de manipulation de supports (18) en direction du deuxième poste de manipulation de supports (86) ;

caractérisé par les étapes consistant à :

- former une boucle de mou (78) de support entre les rouleaux de transport de support (26) se déplaçant à la vitesse (V2) et le premier poste de manipulation de supports (18) qui introduit la feuille de support (16) à la vitesse (V1), ladite boucle de mou continuant à se former jusqu'à ce qu'un bord arrière (80) de la feuille de support (16) soit dégagé du premier poste de manipulation de supports (18), ledit bord arrière (80) étant tirée derrière le chariot mobile (20) ;
- placer un guide de support pivotant (74) fixé au chariot (20) dans une première position essentiellement horizontale lorsque le chariot (20) est placé dans la position de collecte de support en vue de guider le bord avant (70) entre la paire de rouleaux de transport de support (26) ; et
- placer le guide pivotant (74) dans une deuxième position inclinée alors que le chariot (20) s'éloigne de la position de collecte, ladite position inclinée guidant la feuille de support (16) durant la formation de la boucle de mou (78).

6. Procédé de stockage temporaire selon la revendication 5, comprenant en outre les étapes consistant à :

- générer un premier signal lorsque ledit bord avant (70) pénètre dans ledit système de stockage temporaire, ledit premier signal étant utilisé pour déclencher la rotation de ladite paire de rouleaux de transport de support (26) ;

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- générer un deuxième signal lorsque ledit bord avant (70) est suffisamment reçu entre la paire de rouleau de support (26), ledit deuxième signal étant utilisé pour interrompre la rotation de la paire de rouleaux de transport de support (26) et pour lancer le transport du chariot (20) en direction de la position de livraison adjacente au deuxième poste de manipulation de supports (86) ; et

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- générer un troisième signal lorsque le bord avant (70) est dégagé du premier poste de manipulation de supports (18).

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7. Procédé de stockage temporaire selon l'une quelconque des revendications 5 ou 6, comprenant en outre l'étape consistant à : lors du dégagement du bord avant (70) du premier poste de manipulation de supports (18), déclencher la rotation de la paire de rouleaux de transport de support (26) pour faire avancer le bord avant (70) jusqu'au deuxième poste de manipulation de supports (86).

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8. Procédé de stockage temporaire selon la revendication 7, dans lequel ledit deuxième poste de manipulation de supports (86) comprend une dévelopeuse (14), le procédé de stockage temporaire comprenant en outre l'étape consistant à générer un quatrième signal en provenance de la dévelopeuse (14), indiquant que la dévelopeuse (14) est prête à accepter le bord avant (70), le quatrième signal étant utilisé pour déclencher la rotation de la paire de rouleaux de transport de support (26) de façon à faire avancer le bord avant (70) jusqu'à la dévelopeuse (14).

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9. Procédé de stockage temporaire selon l'une quelconque des revendications 5 à 8, comprenant en outre l'étape consistant à, suite au transport de la totalité de la feuille de support (16) au-delà de la paire de rouleaux de transport de support (26) jusqu'au deuxième poste de manipulation de supports (86), faire revenir le chariot (20) à la deuxième vitesse (V2) jusqu'à la position de collecte de support adjacente au premier poste de manipulation de supports (18) pour recevoir un bord avant (70) d'une autre feuille de support (16).

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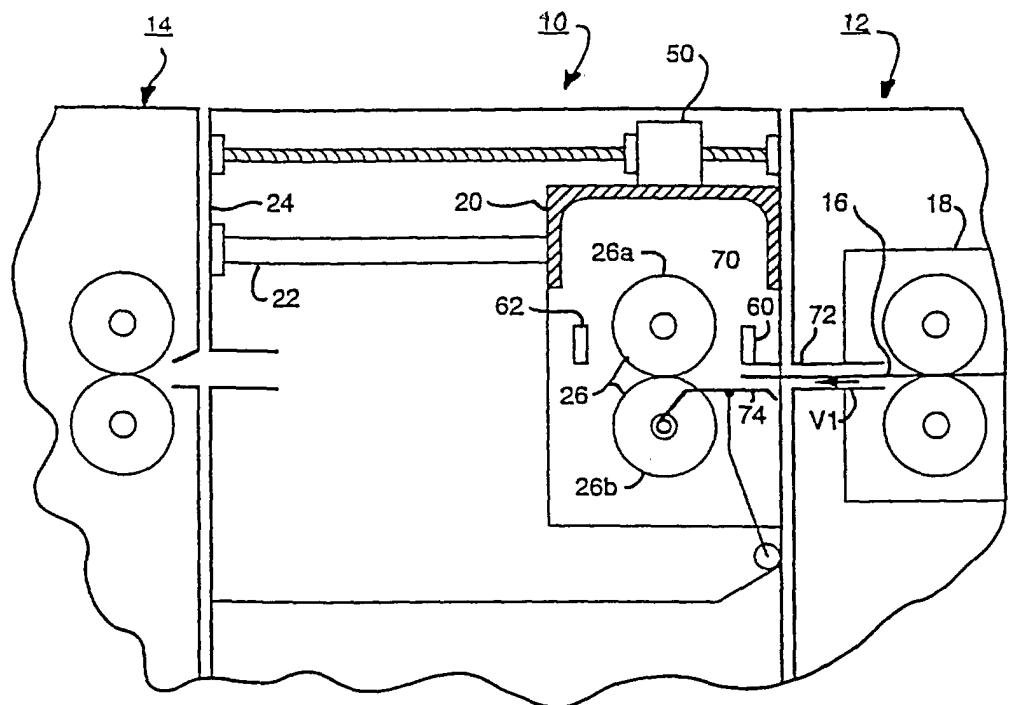


FIG. 1A

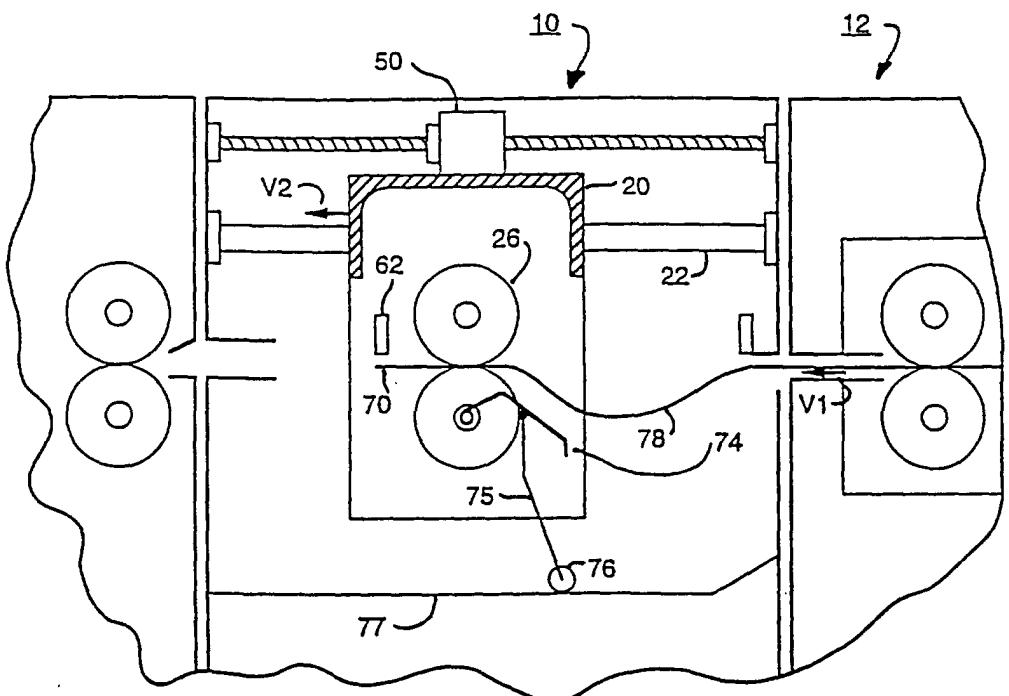


FIG. 1B

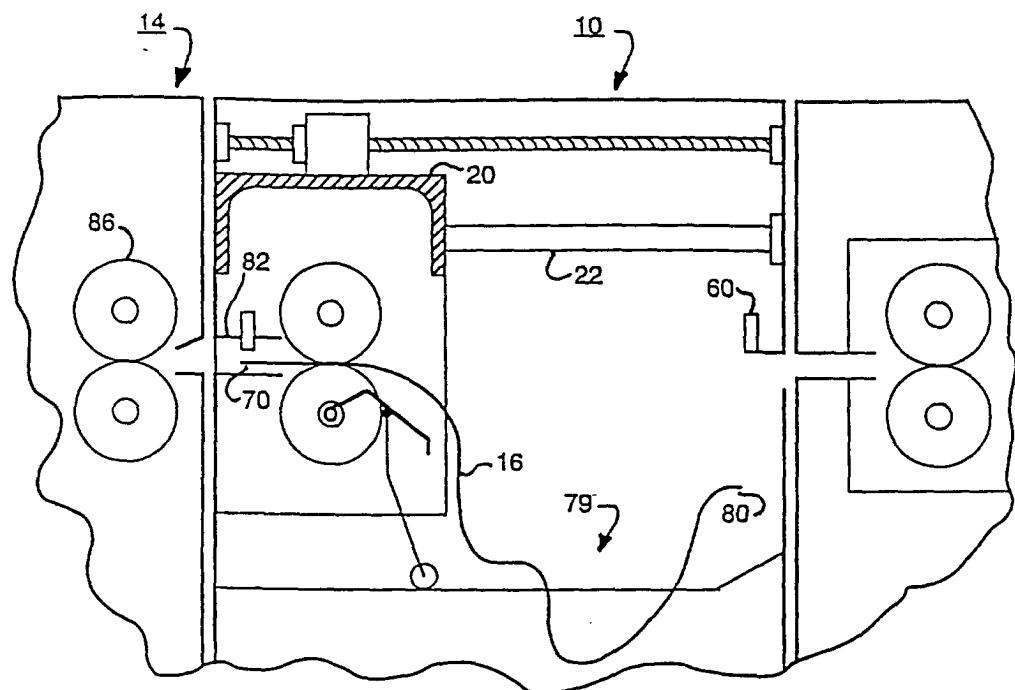


FIG. 1C

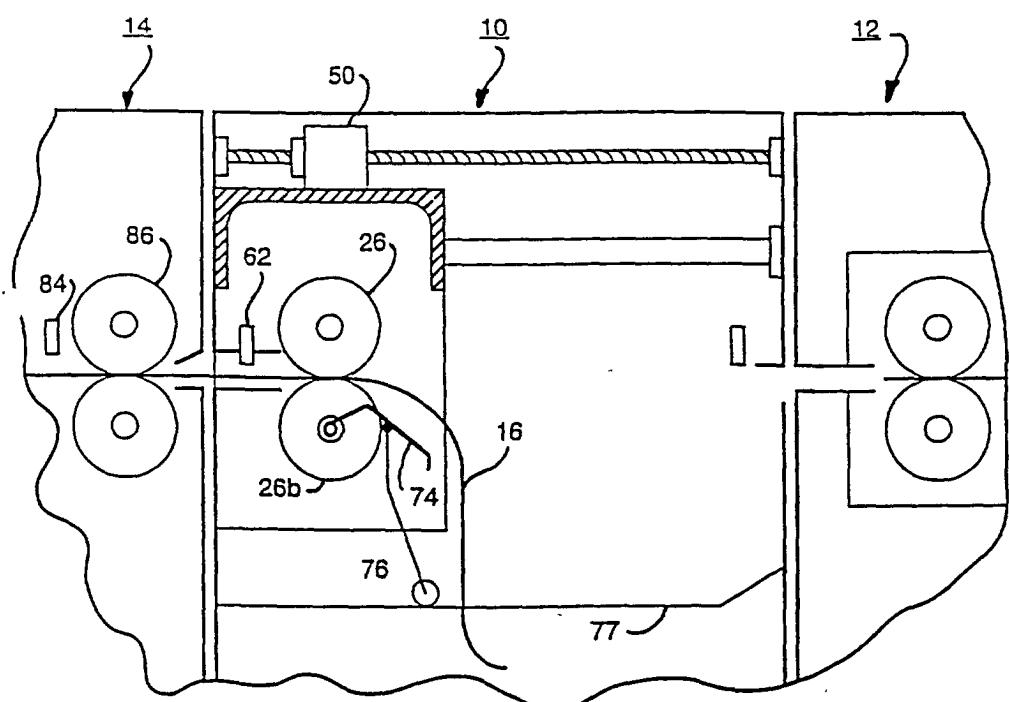


FIG. 1D

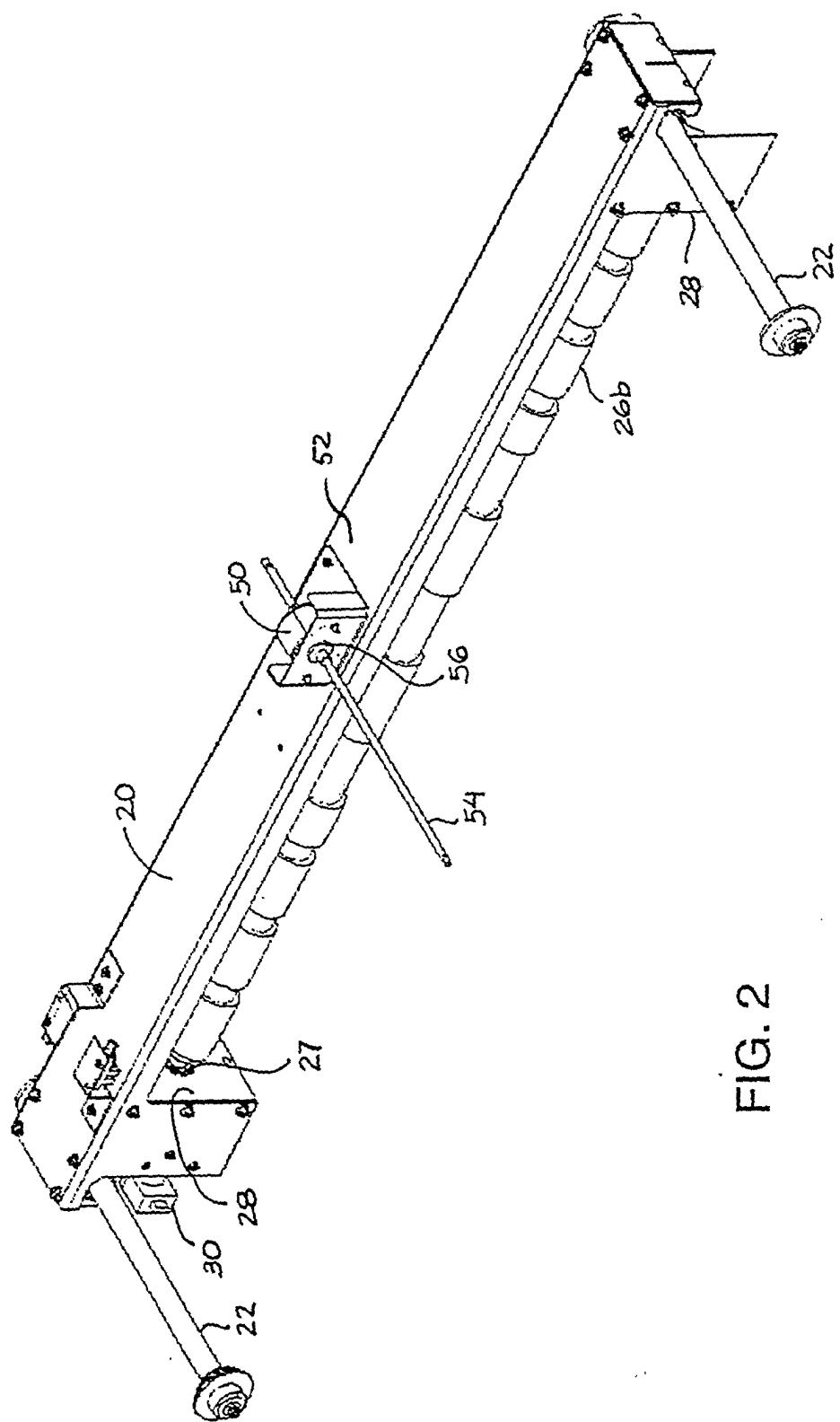


FIG. 2

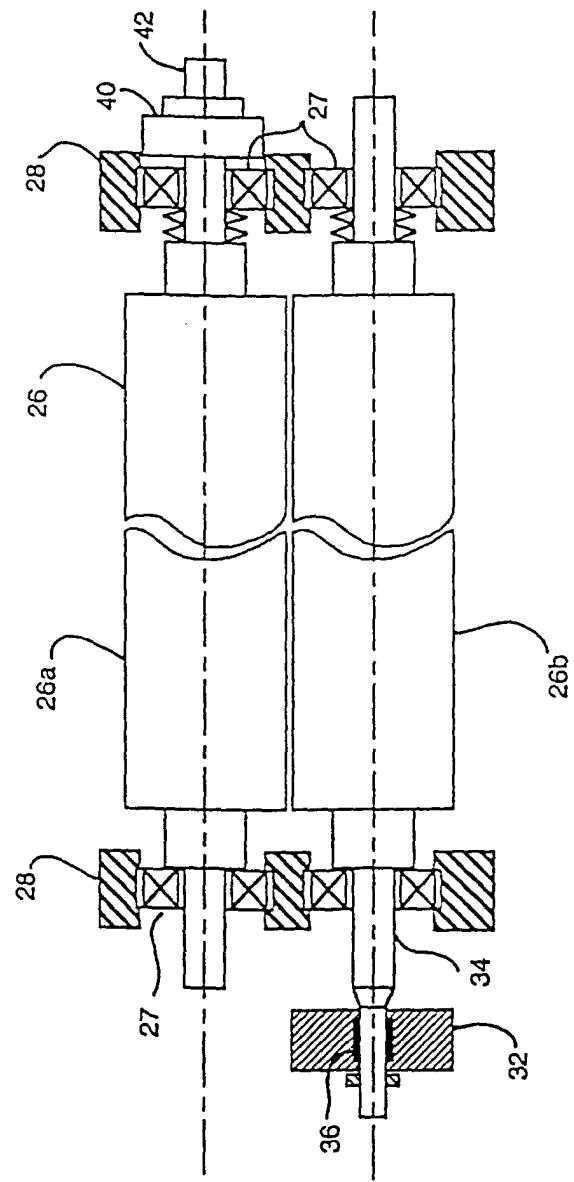


FIG. 3

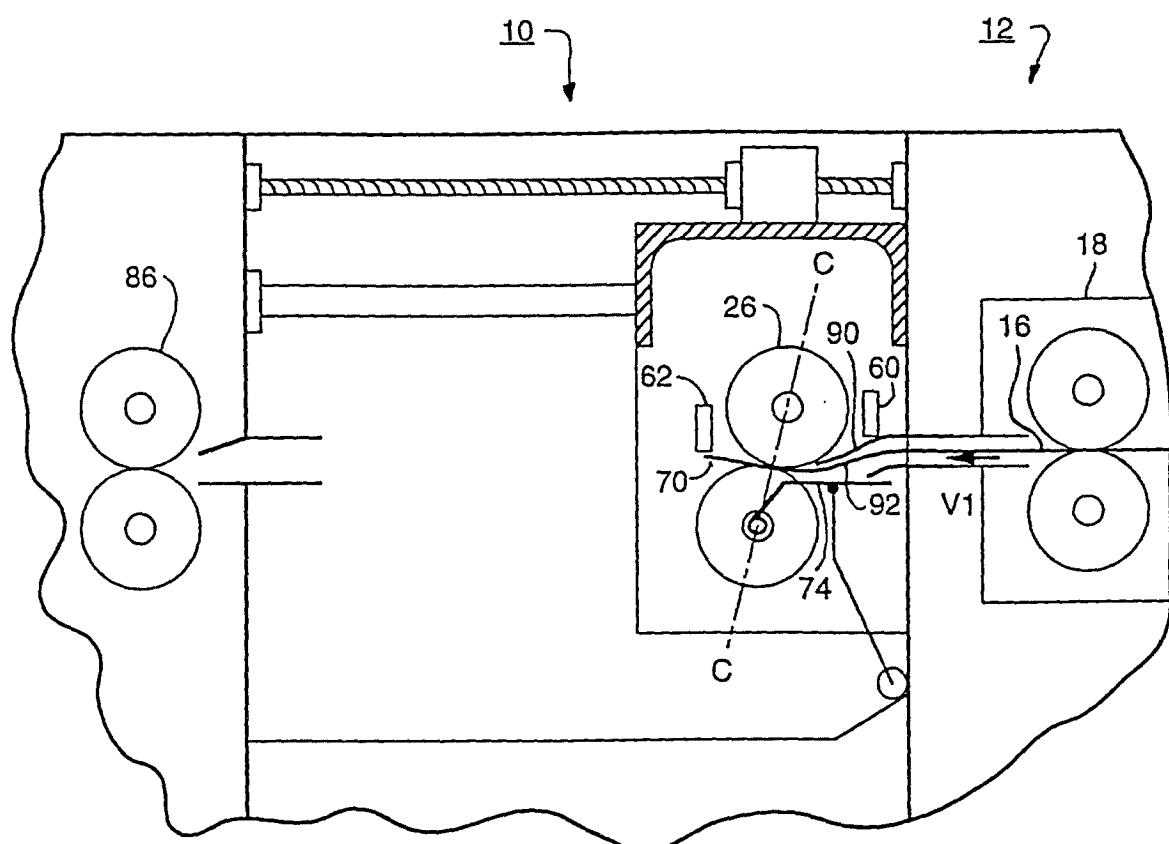


FIG. 4